

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

WASHINGTON, D.C. 20460

AUG -3 2000

OFFICE OF PREVENTION, PESTICIDES AND TOXIC SUBSTANCES

MEMORANDUM

SUBJECT:

Renewal Request for an Experimental Use Permit for Amplify® Sprout Inhibitor

(EPA Symbol No. 034704-EUP-13), containing 99.7% 2, 6-Diisopropyl-

naphthalene [2, 6-DIPN; (Chemical No. 055803)] as its Active Ingredient; and a

Petition to Extend the Temporary Exemption from the Requirement of a

Tolerance on Stored Potatoes (PP# 8G05008). Review of Toxicity, Metabolism, and Residue Chemistry Studies. DP Barcodes D267369 and D267587; Case Nos. 062532 and 290334; Submission Nos. S581969 and S582755; MRIDs 451632-01

and -02.

FROM:

Russell S. Jones, Ph.D., Biologist

Biochemical Pesticides Branch

Biopesticides & Pollution Prevention Division (7511C)

THRU:

Freshteh Toghrol, Ph.D., Senior Scientist

Biochemical Pesticides Branch

Biopesticides & Pollution Prevention Division (7511C)

TO:

Driss Benmhend, Regulatory Action Leader

Biochemical Pesticides Branch

Biopesticides & Pollution Prevention Division (7511C)

ACTION REQUESTED

Platte Chemical Co. requests a renewal of an Experimental Use Permit (EUP; EPA Symbol No. 034704-EUP-13) and a petition (PP# 8G05008) to extend a temporary tolerance exemption for Amplify® Sprout Inhibitor, containing 99.7% 2, 6-DIPN, on stored potatoes. The registrant intends to apply a total of 2500 lbs of 2,6-DIPN on approximately 150 million lbs of potatoes in 10-18 storage facilities located in Idaho, Maine, Minnesota, North Dakota, Oregon, South Dakota, Washington, and Wisconsin. Testing is proposed to begin on September 28, 2000 and conclude by September 28, 2001. The treated potatoes will represent the harvest from 0.31 percent of the total potato harvest in the United States. The product will be applied as an aerosol at a single application rate of 1 lb of active ingredient (a.i.) per 60,120 lbs of potatoes. According to the proposed product label, the product is applied as an aerosol fog to stored potatoes in enclosed facilities with and without recirculating air systems. In support of the EUP

request and extension of the tolerance exemption, the registrant submitted a description of the revised field test, supplementary metabolism and toxicity data (MRID 451632-01), residue chemistry and storage stability data (MRID 451632-02), and a proposed EUP label.

BACKGROUND

In 1999, BPPD approved an Experimental Use Permit (EUP; EPA File Symbol No. 34704-EUP-13) to apply 5000 lbs of 2, 6-DIPN on 300 million lbs of potatoes to inhibit sprouting during storage (see Memoranda from R. S. Jones to R. Kumar, dated 4/14/99; and from R. S. Jones to D. Benmhend, dated 8/18/99). A petition for a temporary exemption from the requirements of a tolerance was submitted with the original EUP (PP# 8G05008) together with a residue chemistry study on stored potatoes. The residue chemistry study was determined to be acceptable for the original EUP (Memorandum from F. Toghrol to R. Kumar, dated 10/19/98). Waivers from the data requirements for ecotoxicity/nontarget organism studies were also supported for the original EUP (Memorandum from R. S. Jones to R. Kumar, dated 4/14/99). No exposure to the environment or nontarget organisms was expected. The active ingredient is classified in toxicity category IV for mammalian acute oral toxicity (LD₅₀ >5000 mg/kg), acute dermal toxicity (LD₅₀ > 5000 mg/kg), and acute inhalation toxicity (LC₅₀ > 2.60 mg/L), and has not been shown to be a dermal irritant or sensitizer (Memorandum from R. S. Jones to R. Kumar, dated 4/14/99).

The registrant is requesting an extension of the EUP in 2000 for the following reasons: (i) an additional year of efficacy data is desired to increase the efficacy database; (ii) to reduce application rates of chloropropham (CIPC, another sprout inhibitor), which is applied with 2, 6-DIPN (which is not as efficacious for long-term control when used alone); use of 2, 6-DIPN allows CIPC rates to be reduced by 50%; and (iii) if needed, the EUP could be used to generate commercial scale residue and monitoring data.

RECOMMENDATIONS AND CONCLUSIONS

- 1. BPPD supports the extension to the EUP (EPA Symbol No. 34704-EUP-13) for the application of on stored potatoes during 2000-2001.
- 2. The submitted metabolism, toxicity, and residue chemistry studies/data are acceptable for this EUP. No additional data are required.
- 3. All other product chemistry, acute toxicity, ecotoxicity/non-target organism, and efficacy studies and/or waivers used to support the original EUP are bridged to support the extension of the EUP.

- 4. BPB supports the extension of the temporary exemption from the requirements of a tolerance for residues of 2, 6-DIPN on potatoes. Based on the submitted data, it is unlikely that detectable residues of 2, 6-DIPN will occur in or on peeled potatoes or potato commodities processed from peeled potatoes when Amplify® Sprout Inhibitor (containing 99.7% 2, 6-DIPN as its active ingredient) is applied to whole potatoes according to label instructions.
- 5. Based on the low toxicity of 2, 6-DIPN and the low potential for human exposure when the product is used according to label directions, BPB concurs with the registrant's conclusion that the product will not pose any significant risks to human health or the environment.
- 6. NOTE To RAL: BPB reserves the option to request additional data/studies when full registration of Amplify® Sprout Inhibitor is requested by the registrant.

STUDY SUMMARIES

Toxicity

The registrant submitted supplementary metabolism and toxicity information on 2, 6-DIPN obtained from the open technical literature (MRID 451632-01). The information/data was collected in the form of four technical journal articles. Two articles described the metabolism of 2, 6-DIPN and di-isopropylnaphthalenes in rats, and two articles described the comparative toxicity of 2, 6-DIPN and naphthalene. These studies are summarized below.

Metabolism

Hasegawa et al. 1982. A. Toxicological Study of Di-isopropylnaphthalenes (KMC) and 1-Phenyl-1-xylylethanes (SAS). Distribution and Disappearance of KMC and SAS in Rats. Industrial Health 20: 237-246. This paper describes the distribution and disappearance of SAS and KMC (a di-isopropylnaphthalene, or DIPN) in the organs of rats (male JCL-SD, 8weeks old). Only KMC (the DIPN) will be discussed in this review. Rats were orally administered the test substance (0.1 mg/kg), either once, or once daily for a month. A single dose of DIPN at 0.1 mg/kg was detectable in all body organs at 2 hours postdosing, but (except for body fat and subcutaneous fat) was non-detectable within 48 hours. Concentrations peaked in body fat and subcutaneous fat (approximately 75 and 85 μ g/g, respectively) at 24 hours postdosing and declined to approximately 60 μ g/g by 48 hours. Similarly, rats subjected to continuous dosing, exhibited detectable levels in all organs at 2 hours postdosing (after the final dose), but (except for body fat and subcutaneous fat) declined to non-detectable levels between 4 hours and 7 days postdosing. DIPN levels in body fat and subcutaneous fat peaked at 2 hours postdosing (approximately 150 and 90 μ g/g, respectively), then declined to approximately 5 μ g/g by 30 days postdosing. The half-life in fat was approximately 7 days. It was concluded that DIPNs exhibit little potential for persistent bioaccumulation.

Kojima et al. 1882. Urinary Metabolites of 2, 6-Diisopropylnaphthalene in Rats. Drug Metabolism and Disposition 10: 429-433. The study authors examined the metabolic pathway of 2, 6-DIPN in rats. They observed that 2, 6-DIPN occurred exclusively via the oxidation of the isopropyl chain of the molecule. Five urinary metabolites and identified by mass spectrometry, infrared spectrometry, and NMR. The compound 2-[6(1-hydroxy-1-methyl)ethylnaphthalen-2-yl]-2-hydroxypropionic acid was identified as the major metabolite of the five identified. The data indicated that the five metabolites were the major urinary metabolites of 2, 6-DIPN. Total urinary excretions of these metabolites accounted for 23% of the administered dose at 24 hours postdosing.

Comparative Toxicity of DIPN and Naphthalene

Honda et al. 1990. Alkylnaphthalene. XI. Pulmonary Toxicity of Naphthalene, 2-Methylnaphthalene, and Isopropylnaphthalenes in Mice. Chem. Pharm. Bull. 38(11): 3130-3135. Pulmonary toxicity of the naphthalene (NAP), 2-methylnaphthalene (2-MN), 2-isopropylnaphthalene (2-IPN), and 2, 6-DIPN was examined in mice. Test substances were administered intraperitoneally at the following doses: NAP, 200 mg/kg; 2-MN, 400 mg/kg; 2-IPN, 3000 mg/kg; and 2, 6-DIPN, 3000 mg/kg. At 24 hours postdosing, pulmonary damage was observed in mice treated with NAP and 2-MN that was accompanied by substantial depletion of glutathione. There was no detectable damage in mice treated with 2-IPN or 2, 6-DIPN and only mild depletions of glutathione. Pretreatment with an inducer increased binding of NAP, 2-MN, and 2-IPN to excised lung slices, but not 2, 6-DIPN. The results suggested that pulmonary toxicity of the test substances was related to their ability to irreversibly bind to lung tissue.

Hoke, H. and R. Zellerhoff. 1998. Metabolism and Toxicity of Diisopropylnaphthalene as Compared to Naphthalene and Monoalkyl Naphthlenes: A Minireview. Toxicology 126:1-7. This is a literature review of 34 technical journal articles. Based on the data obtained from the journal articles, the authors concluded that diisopropylnaphthalenes (DIPNs and other highly alkylated naphthalenes have low toxicity and offer favorable safety properties due to their "alkyl character," and a metabolic pathway that proceeds only via oxidation of the isopropyl side chain. This metabolic pathway is highly correlated with a lack of lung toxicity, whereas other lung-specific toxic naphthalenes are metabolized via enzymatic oxidation of the aromatic ring. Toxic effects of naphthalenes are associated with a metabolic detoxifying that utilizes pulmonary glutathione (GSH). Once the GSH pool is exhausted, pulmonary damage has been observed to occur in experimental animals (rats, mice). Alkylated naphthalenes (such as 2-isopropyl- and 2, 6-diisopropylnaphthalene do not deplete the pulmonary GSH pool nor induce any pulmonary damage. Comparative metabolic studies with rats and rabbits suggested that toxicity is dependent on the formation of reactive metabolites and their ability to irreversibly bind with lung tissue. Lack of lung toxicity following administration of DIPNs is highly correlated with the lack of formation of ringoxidized intermediates and an undepleted GSH pool. Based on the aforementioned data, the authors concluded that in other animal species and humans, as a general rule, DIPN is unlikely to be converted to toxic ring-oxidized intermediates.

Classification: Acceptable; no additional toxicity or metabolism data are required for this EUP.

Residue Chemistry

Postharvest fumigation studies were conducted using Amplify® Sprout Inhibitor (containing 98.6% 2, 6-DIPN as its active ingredient) to determine the amount of 2, 6-DIPN residues in/on whole potatoes, potato flesh and potato peels. The study was conducted in three phases: (i) Phase 1: a freezer storage stability study or whole potatoes and potato peels; (ii) Phase 2: residue analysis of Russet potatoes (whole potatoes, potato flesh, and potato peels) from a previous study (CARDC Study #1337, Treatment ii, Time 0); and (iii) Phase 3: residue analysis of potato flesh from a previous study (UAP NW 97-001, peeled potatoes from the 0, 30, and 90-day sampling intervals). All samples were stored at ≤-20°C prior to analysis. Samples were analyzed by HPLC. The HPLC methods were adequate for determining 2, 6-DIPN residues in potato matrices (whole, potato, potato flesh, and potato peels); the limit of quantitation for each matrix was 0.02 ppm. Detector response were linear in the concentration ranges tested (MRID 451632-02, Table VI, pp. 44-45, attached).

Complete details of the studies are contained in MRID 451632-02. No DERs were written for these studies, but copies of data summary tables (Tables I through III, MRID 451632-02., pp. 31-36) are attached to this review. Table IV (MRID 451632-02, pp. 37-39, attached) lists the important dates of all analyses. Analytical methods are briefly described in Tables V and VI (MRID 451632-02, pp. 40-45, attached) and in detail in Appendix 5, raw data sheets are contained in Appendix 6, and representative chromatograms of standards and samples are presented in Appendix 7. The results of the studies are summarized below.

Phase 1: Frozen, stored samples of whole potatoes and potato peels fortified with 0.2 ppm of 2, 6-DIPN were analyzed by HPLC. There were five replications for each sample set and duplicate fortifications for each replication. Concurrent analytical method recoveries from whole potatoes fortified 0.2 ppm 2, 6-DIPN were 92.1-108.7%; stored recoveries were 64-66.7%. Stored recoveries were not corrected for the average concurrent recovery which was >100%. No residues were detected in the untreated control. Concurrent analytical method recoveries from potato peels fortified 0.2 ppm 2, 6-DIPN were 86.8-87.5%; stored recoveries were 64-66.7%. Stored recoveries were corrected for the average concurrent recovery. Residues of 0.00850 ppm were detected in the untreated control, but this was less than the Limit of Quantitation (0.02 ppm).

The data demonstrated that 2, 6-DIPN residues were stable in whole potatoes and potato peels for 1025 days and 1001 days, respectively, in frozen storage (see attached Table I; MRID 451632-02, pp. 31-32).

Phase 2: Russet potatoes [obtained from a previous study (CARDC Study No. 1337); see Memorandum from R. S. Jones to D. Benmhend, dated 8/18/99, for details) treated with a single application of 20 ppm a.i./lb potatoes; potatoes were sampled at 0 hours following the final application) were analyzed by HPLC. There were three replications, with each replication consisting of two whole potatoes; each whole potato was separated into three samples (whole potato, potato peel, potato flesh). Each sample was analyzed with two fortified samples (2, 6-DIPN at 0.02 and 2.5 ppm) and an untreated control. Concurrent analytical method recoveries from fortified whole potatoes were 95.4% and 84.3%, respectively; residues in the untreated control were 0.02281 ppm. Concurrent analytical method recoveries from potato peels were 85.8% and 87.9%, respectively; residues in the untreated control were 0.01001 ppm.

In whole potatoes, 2, 6-DIPN residues ranged from 0.11 to 0.16 ppm (mean: 0.13 ppm). No residues (≤0.02 ppm) were detected in potato flesh. Residues in potato peels ranged from 1.46-1.76 ppm (mean: 1.59 ppm). Since no residues were detected in the flesh, a study to determine residues in french fries processed from peeled potatoes was not conducted (see attached Table II; MRID 451632-02, pp. 33-35).

<u>Phase 3</u>: Whole potatoes obtained from a previous study (UAP NW 97-001; sampled at 0, 30, and 90 days posttreatment) were analyzed for 2, 6-DIPN residues by HPLC. There were three replicates for each sampling interval and each replicate consisted of eight peeled potatoes. Each replicate was subsequently divided into a flesh fraction and a french fry fraction. Each sample was analyzed with two fortified samples (2, 6-DIPN at 0.02 and 2.5 ppm) and an untreated control. Concurrent analytical method recoveries from fortified potato flesh samples were 91.4% and 89.1%, respectively; no residues were detected in the untreated control.

No residues (≤0.02 ppm) were detected in potato flesh. Since no residues were detected in the flesh, french fries processed from peeled potatoes were not analyzed for residues (see attached Table III; MRID 451632-02, p. 36).

Conclusions: Based on the residue data obtained from the studies described above, t is unlikely that detectable residues of 2, 6-DIPN will be detected in potato flesh (i. e. peeled potatoes) when the product (Amplify® Sprout Inhibitor) is applied according to label directions.

Classification: Acceptable; no additional residue data are required for this EUP.

cc: R. S. Jones, F. Toghrol, D. Benmhend, BPPD Subject File R. S. Jones, F. T. BPPD, CM2, 9th Floor; 703/308-5071: 8/03/99

Table I, page 1 of 2

Phase 1

Analysis Results for 2,6-DIPN Storage Stability in Whole Potatoes using "CARDC-1298-DIPN"

Stored Recoveries

Sample Description	CARDC Sample	Set	ppm found	Percent Recovery	Corrected Percent Recovery
UTC	1354-1	Whole-1025 Days	0.00000		
		,	(<0.02)		
UTC + 0.2 ppm S	1354-4	Whole-1025 Days	0.13336	66.7	66.7
UTC + 0.2 ppm S	1354-5	Whole-1025 Days	0.12800	64.0	64.0

Concurrent Recoveries

Sample	CARDC		ppm	Percent
Description	Sample	Set	found*	Recovery
UTC + 0.2 ppm C	1354-2	Whole-1025 Days	0.18424	92.1
UTC + 0.2 ppm C	1354-3	Whole-1025 Days	0.21741	108.7

S = Storage Stability

C = Concurrent Recovery

UTC = Untreated Control

Corrected Percent Recovery = Corrected for average concurrent recovery <100%.

*Corrected for any background found in untreated control.

Table I, page 2 of 2

Phase 1

Analysis Results for 2,6-DIPN Storage Stability in Potato Peels using "CARDC-1298-DIPN/POTATO PEELS"

Stored Recoveries

Sample Description	CARDC Sample	Set	ppm found	Percent Recovery	Corrected Percent Recovery
UTC	1354-6	Peels-1001 Days	0.00850		
			(<0.02)		
UTC + 0.2 ppm S	1354-9	Peels-1001 Days	0.11713	58.6	67.2
UTC + 0.2 ppm S	1354-10	Peels-1001 Days	0.13024	65.1	74.7

Concurrent Recoveries

Sample	CARDC		ppm	Percent
Description	Sample	Set	found*	Recovery
UTC + 0.2 ppm C	1354-7	Peels-1001 Days	0.17507	87.5
UTC + 0.2 ppm C	1354-8	Peels-1001 Days	0.17355	86.8

S = Storage Stability

C = Concurrent Recovery

UTC = Untreated Control

Corrected Percent Recovery = Corrected for average concurrent recovery <100%.

*Corrected for any background found in untreated control.

Table II, page 1 of 3

Phase 2

Analysis Results for 2,6-DIPN in Whole Potatoes using "CARDC-1298-DIPN"

	CARDC		ppm	Total μg/
Sample Description	Sample	Set	found	sample
UTC Whole Potatoes	1354-23	Phase 2-WP	0.02	NA
Time 0 Russet TRT ii Rep 1	1354-26	Phase 2-WP	0.12	28.83
Time 0 Russet TRT ii Rep 2	1354-27	Phase 2-WP	0.16	38.13
Time 0 Russet TRT ii Rep 3	1354-28	Phase 2-WP	0.11	24.59

Concurrent Recoveries

Sample Description	CARDC Sample	Set	ppm found*	Percent Recovery
UTC Whole Potatoes + 0.02 ppm	1354-24	Phase 2-WP	0.01907	95.4
UTC Whole Potatoes + 2.5 ppm	1354-25	Phase 2-WP	2.10779	84.3

NA = Not Applicable

^{*}Concurrent recoveries corrected for any residue found in untreated control.

Table II, page 2 of 3

Phase 2

Analysis Results for 2,6-DIPN in Potato Peels using "CARDC-1298-DIPN/POTATO PEELS"

·	CARDC		ppm	Total μg/
Sample Description	Sample	Set	found	sample
UTC Potato Peels	1354-11	Phase 2-PE	< 0.02	NA
Time 0 Russet TRT ii Rep 1	1354-14	Phase 2-PE	1.76	32.17
Time 0 Russet TRT ii Rep 2	1354-15	Phase 2-PE	1.56	29.58
Time 0 Russet TRT ii Rep 3	1354-16	Phase 2-PE	1.46	33.38

Concurrent Recoveries

	CARDC		ppm	Percent
Sample Description	Sample	Set	found*	Recovery
UTC Potato Peels + 0.02 ppm	1354-12	Phase 2-PE	0.01716	85.8
UTC Potato Peels + 2.5 ppm	1354-13	Phase 2-PE	2.19699	87.9

NA = Not Applicable UTC = Untreated Control

^{*}Concurrent recoveries corrected for any residue found in untreated control.

Table II, page 3 of 3

Phase 2

Analysis Results for 2,6-DIPN in Potato Flesh using "CARDC-1298-DIPN/POTATO PEELS"

Sample Description	CARDC Sample	Set	ppm found	Total μg/ sample
UTC Potato Flesh	1354-41	Phase 2-FL Repeat ^a	<0.02	NA
Time 0 Russet TRT ii Rep 1	1354-44	Phase 2-FL Repeat ^a	<0.02	NA
Time 0 Russet TRT ii Rep 2	1354-45	Phase 2-FL Repeat ^a	<0.02	NA
Time 0 Russet TRT ii Rep 3	1354-46	Phase 2-FL Repeat ^a	<0.02	NA

Concurrent Recoveries

Sample Description	CARDC Sample	Set	ppm found*	Percent Recovery
UTC Potato Flesh + 0.02 ppm	1354-42	Phase 2-FL Repeat ^a	0.01565	78.3
UTC Potato Flesh + 2.5 ppm	1354-43	Phase 2-FL Repeat ^a	2.10164	84.1

^a Set repeated using "CARDC-1298-DIPN/POTATO PEELS" (Refer to Protocol Amendment #1)

NA = Not Applicable

^{*}Concurrent recoveries corrected for any residue found in untreated control.

Table III

Phase 3

Analysis Results for 2,6-DIPN in Potato Flesh using "CARDC-1298-DIPN/POTATO PEELS"

	CARDC		ppm	Total μg/
Sample Description	Sample	Set	found	sample
1A-1 UTC	1354-47	Phase 3-FL Repeat ^a	<0.02	NA
2A-1 0 day	1354-50	Phase 3-FL Repeat ^a	<0.02	NA
2B-1 0 day	1354-51	Phase 3-FL Repeat ^a	<0.02	NA
2C-1 0 day	1354-52	Phase 3-FL Repeat ^a	<0.02	NA
5A-1 30 day	1354-53	Phase 3-FL Repeat ^a	<0.02	NA
5B-1 30 day	1354-54	Phase 3-FL Repeat ^a	<0.02	NA
5C-1 30 day	1354-55	Phase 3-FL Repeat ^a	<0.02	NA
9A-1 90 day	1354-56	Phase 3-FL Repeat ^a	<0.02	NA
9B-1 90 day	1354-57	Phase 3-FL Repeat ^a	< 0.02	NA
9C-1 90 day	1354-58	Phase 3-FL Repeat ^a	<0.02	NA

Concurrent Recoveries

	CARDC		ppm	Percent
Sample Description	Sample	Set	found*	Recovery
1A-1 UTC + 0.02 ppm	1354-48	Phase 3-FL Repeat ^a	0.01829	91.4
1A-1 UTC + 2.5 ppm	1354-49	Phase 3-FL Repeat ^a	2.22722	89.1

^a Set repeated using "CARDC-1298-DIPN/POTATO PEELS" (Refer to Protocol Amendment #1)

NA = Not Applicable

^{*}Concurrent recoveries corrected for any residue found in untreated control.

TABLE IV, page 1 of 3

Important Dates of Analysis

Phase 1

		1	Date	
CARDC		Date	Fortified/	Date
Sample	Description	Received	Extracted*	Analyzed
Set Whole-102	5 Days			
1354-1 UTC	Whole Potatoes	3/26/1997	1/31/2000	2/2, 2/3/2000
1354-2 C	Whole Potatoes	3/26/1997	1/31/2000	2/2, 2/3/2000
1354-3 C	Whole Potatoes	3/26/1997	1/31/2000	2/2, 2/3/2000
1354-4 S	Whole Potatoes	3/26/1997	4/11/1997	2/2, 2/3/2000
1354-5 S	Whole Potatoes	3/26/1997	4/11/1997	2/2, 2/3/2000
Set Peels-1001	Days	-		
1354-6 UTC	Potato Peels	5/2/1997	1/31/2000	2/2/2000
1354-7 C	Potato Peels	5/2/1997	1/31/2000	2/2/2000
1354-8 C	Potato Peels	5/2/1997	1/31/2000	2/2/2000
1354-9 S	Potato Peels	5/2/1997	5/5/1997	2/2/2000
1354-10 S	Potato Peels	5/2/1997	5/5/1997	2/2/2000

S = Storage Stability

C = Concurrent Recovery

^{*}The untreated control samples were extracted on the same day that the samples were fortified.

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Important Dates of Analysis

Phase 2

				Date	
CARDC		Date	Date	Fortified/	Date
Sample	Description	Received	Prepared	Extracted*	Analyzed
Set Phase	2-WP				
1354-23	Whole Potatoes	4/22/1999	2/2/2000	2/3/2000	2/8/2000
UTC					
1354-24	Whole Potatoes	4/22/1999	2/2/2000	2/3/2000	2/8/2000
1354-25	Whole Potatoes	4/22/1999	2/2/2000	2/3/2000	2/8/2000
1354-26	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/8/2000
1354-27	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/8/2000
1354-28	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/8/2000
Set Phase	2-PE				
1354-11	Potato Peels	4/22/1999	2/2/2000	2/3/2000	2/7/2000
UTC		,			
1354-12	Potato Peels	4/22/1999	2/2/2000	2/3/2000	2/7/2000
1354-13	Potato Peels	4/22/1999	2/2/2000	2/3/2000	2/7/2000
1354-14	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/7/2000
1354-15	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/7/2000
1354-16	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/3/2000	2/7/2000
Set Phase	2-FL Repeat				
1354-41	Potato Flesh	4/22/1999	2/2/2000	2/14/2000	2/14/2000
UTC		•			
1354-42	Potato Flesh	4/22/1999	2/2/2000	2/14/2000	2/14/2000
1354-43	Potato Flesh	4/22/1999	2/2/2000	2/14/2000	2/14/2000
1354-44	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/14/2000	2/14/2000
1354-45	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/14/2000	2/14/2000
1354-46	Time 0 Russet TRT ii	4/22/1999	2/2/2000	2/14/2000	2/14/2000

^{*}The untreated control samples were extracted on the same day that the samples were fortified.

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Important Dates of Analysis

Phase 3

				Date	
CARDC		Date	Date	Fortified/	Date
Sample	Description	Received	Prepared	Extracted*	Analyzed
Set Phase	3-FL Repeat				
1354-47	1A-1	4/23/1997	2/4/2000	2/15/2000	2/15/2000
UTC	<u> </u>		:		
1354-48	1A-1	4/23/1997	2/4/2000	2/15/2000	2/15/2000
1354-49	1A-1	4/23/1997	2/4/2000	2/15/2000	2/15/2000
1354-50	2A-1 0 day	4/23/1997	2/4/2000	2/15/2000	2/15/2000
1354-51	2B-1 0 day	4/23/1997	2/4/2000	2/15/2000	2/15/2000
1354-52	2C-1 0 day	4/23/1997	2/4/2000	2/15/2000	2/15/2000
1354-53	5A-1 30 day	5/22/1997	2/4/2000	2/15/2000	2/15/2000
1354-54	5B-1 30 day	5/22/1997	2/4/2000	2/15/2000	2/15/2000
1354-55	5C-1 30 day	5/22/1997	2/4/2000	2/15/2000	2/15/2000
1354-56	9A-1 90 day	7/23/1999	2/4/2000	2/15/2000	2/15/2000
1354-57	9B-1 90 day	7/23/1999	2/4/2000	2/15/2000	2/15/2000
1354-58	9C-1 90 day	7/23/1999	2/4/2000	2/15/2000	2/15/2000

^{*}The untreated control samples were extracted on the same day that the samples were fortified.

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Typical High Performance Liquid Chromatographic Conditions for "CARDC-1298-DIPN"

Instrument:

Hewlett-Packard Model 1090 Series II

Liquid Chromatograph

Mobile Phase:

Acetontrile

Mobile Phase Flow Rate:

0.75 mL/min

Column:

Zorbax ODS, 4.6 mm ID x 25 cm, 7 μm

Guard Column:

Pierce RP-8, Newguard, 15 x 3.2 mm, 7 μm

Injection Volume:

100 μL

Stop Time:

12 minutes

Detector:

UV DAD

Wavelength:

254 nm

Table V, page 2 of 4

Typical High Performance Liquid Chromatographic Conditions for "CARDC-1298-DIPN"

Integrator commands:

```
* LIST: METH @
METHOD HAME: M: DIPH MET
RUN PARAMETERS
ZERO = 15
ATT 2° =
CHT SP =
         8
        0.5
AR REJ = '0
THRSH = 0
PK_UD = 0.19
TIMETABLE EVENTS
   0.010 INTG # =
   5.600 ATT 2^ =
   5.610 ZERO
                  1.5
   7.250 INTG # =
  7.260 INTG # *
10.500 INTG # *
                 9
  10.510 INTG # * -8
  12.000 STOP
CALIBRATION
NO CALIB TBL
INTEGRATION PLOT TYPE ..... FILTERED
Presentation plot ..... NO
RUN DATA STORAGE
Store signal data ..... NO
Store processed peaks ..... NO
REPORT OPTIONS
Suppress local report .... NO
HEIGHT% report ..... YES
Report uncalibrated peaks ... NO
Extended report ..... YES
PRINT & POST-RUN LIST OPTIONS
Large font ..... YES
Store post-run report ..... NO
External post-run report .... NO
List run parameters . . . . NO
List calibration table .... NO
List remote method ..... NO
Form-feed before report .... NO
Form-feed after report .... NO
 Skip perforations in report . NO Skip perforations in plot . . NO
```

Table V, page 3 of 4

Typical High Performance Liquid Chromatographic Conditions for "CARDC-1298-DIPN/POTATO PEELS"

Instrument:

Hewlett-Packard Model 1090 Series II

Liquid Chromatograph

Mobile Phase:

Acetontrile

Mobile Phase Flow Rate:

0.75 mL/min

Column:

Zorbax ODS, 4.6 mm ID x 25 cm, 7 μm

Guard Column:

Pierce RP-8, Newguard, 15 x 3.2 mm, 7 μm

Injection Volume:

100 μL

Stop Time:

12 minutes

Detector:

UV DAD

Wavelength:

254 nm

Table V, page 4 of 4

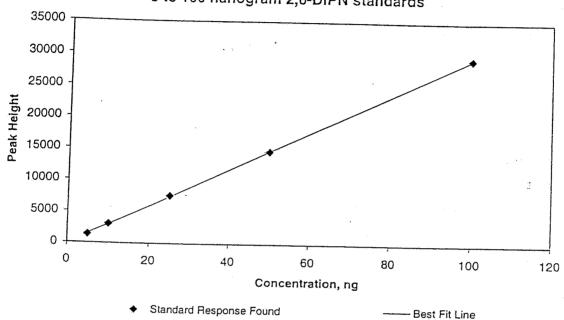
Typical High Performance Liquid Chromatographic Conditions for "CARDC-1298-DIPN/POTATO PEELS"

Integrator commands:

```
LIST: METH
RUN PARAMETERS
ZERO = 15
ATT 2^ =
CHT SP =
          8
         0.5
AR REJ =
         0
THRSH
      = -1
      =
PK WD
          0.24
TIMETABLE EVENTS
                  9
   0.010 INTG # =
                  2
   5.600 ATT 21
   5.610 ZERO
                  15
   7.250 INTG # =
                  - 9
   7.260 INTG # =
                  8
                  9
  10.500 INTG # =
  10.510 INTG # = -8
  12.000 STOP
CALIBRATION
NO CALIB TBL
INTEGRATION PLOT TYPE ..... FILTERED
Presentation plot ...... NO
RUN DATA STORAGE
Store signal data ...... NO
Store processed peaks ..... NO
REPORT OPTIONS
Suppress local report ..... NO
HEIGHI% report ..... YES
Report uncalibrated peaks ... NO
Extended report ..... YES
PRINT & POST-RUN LIST OPTIONS
Large font ..... YES
Store post-run report ..... NO
External post-run report .... NO
List run parameters ..... NO
List timetable ..... NO
List calibration table ..... NO
List remote method ..... NO Form-feed before report ..... NO
Form-feed after report ..... NO
Skip perforations in report . NO
Skip perforations in plot ... NO
```

TABLE VI, page 1 of 2

Typical Standard Calibration Curve for 2,6-DIPN 5 to 100 nanogram 2,6-DIPN standards



Set: Whole-1025 Days

Phase 1

Analyzed on 2/2, 2/3/2000

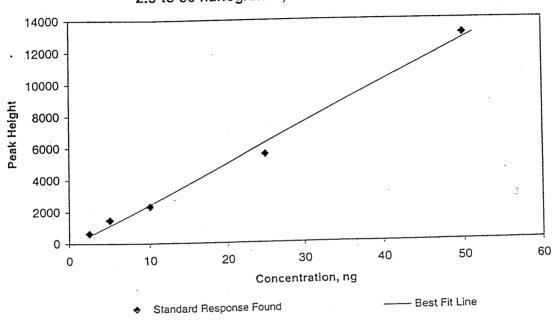
CARDC Standard	Standard Concentration(nanograms)	Integrator Peak Height	nanograms found*
12065	5	1375	4.52
12064	10	3026	10.16
12063	25	7530	25.55
12062	50	14633	49.81
12061	100	29311	99.96

^{*} Back calculated by Least Squares Linear Regression

Regression Output:	
Constant Regression Term, Intercept:	53.0049751
Regression Coefficient, slope:	292.6840796
Correlation Coefficient, R:	1.0000
Coefficient of Determination, R ² :	0.9999

TABLE VI, page 2 of 2

Typical Standard Calibration Curve for 2,6-DIPN 2.5 to 50 nanogram 2,6-DIPN standards



Set: Peels-1001 Days

Phase 1

Analyzed on 2/2/2000

CARDC Standard 12066 12065 12064	Standard Concentration (nanograms) 2.5 5 10 25	Integrator Peak Height 627 1471 2314 5566	nanograms found* 3.05 6.33 9.60 22.21
12063	25		51.31
12062	50	13067	171.71

^{*} Back calculated by Least Squares Linear Regression

Regression Output:	
Constant Regression Term, Intercept:	-159.4498382
	257.7540453
Regression Coefficient, slope:	0.9962
Correlation Coefficient, R:	
Coefficient of Determination, R ² :	0.9925

Table VII, page 1 of 2

Sample Weights

Phase 2

				
Sample Description	1		Weight	Total
	Rep	Matrix	(g)	Weight (g)
Time 0 Russet TRT ii	1	Whole Potatoes	144.62	
Time 0 Russet TRT ii	1_1_	Whole Potatoes	95.60	240.22
T: 0 T				
Time 0 Russet TRT ii	2	Whole Potatoes	168.26	
Time 0 Russet TRT ii	2	Whole Potatoes	70.07	238.33
				15
Time 0 Russet TRT ii	3	Whole Potatoes	143.53	
Time 0 Russet TRT ii	3	Whole Potatoes	80.01	223.54
-				
Time 0 Russet TRT ii	1	Potato Peels	 	18.28
Time 0 Russet TRT ii	2	Potato Peels	<u> </u>	18.96
Time 0 Russet TRT ii	3	Potato Peels	<u> </u>	22.86
Time 0 Russet TRT ii	1	Potato Flesh		180.53
Time 0 Russet TRT ii	2	Potato Flesh		188.30
Time 0 Russet TRT ii	3	Potato Flesh		194.96
UTC		Whole Potatoes		911.31
UTC		Potato Peels	·	135.36
UTC		Potato Flesh		962.39

Table VII, page 2 of 2

Sample Weights

Phase 3

, , , , , , , , , , , , , , , , , , , 	T	Weight	Total
Sample Description	Matrix	(g)	Weight (g)
2A-1	Potato Flesh	368.88	
2A-1	French Fry	351.68	720.56
2111		·	
2B-1	Potato Flesh	329.68	
2B-1	French Fry	342.28	671.96
2C-1	Potato Flesh	421.23	
2C-1	French Fry	401.03	822.26
5A-1	Potato Flesh	428.68	
5A-1	French Fry	382.89	811.57
5B-1	Potato Flesh	432.70	0.000
5B-1	French Fry	383.44	816.14
			<u> </u>
5C-1	Potato Flesh	517.61	1014.09
5C-1	French Fry	496.48	1014.09
		105.00	
9A-1	Potato Flesh	495.99	933.89
9A-1	French Fry	437.90	933.69
		500.00	
9B-1	Potato Flesh	598.22	1178.89
9B-1	French Fry	580.67	1170.09
		170.76	
9C-1	Potato Flesh	478.76	876.55
9C-1	French Fry	397.79	070.33
		150 (2	
1A-1 UTC	Potato Flesh	458.62 420.30	878.92
1A-1 UTC	French Fry	420.30	0/0.72

NOTE: Due to residue levels of <0.02 ppm in the potato flesh samples, the french fry samples were not analyzed.

EPA Form 8570-4 (Revr 8-94)-